

Name: _____ Date: _____ Pd: _____

How Do Your Muscles Work?

INTRODUCTION:

Much of the work of the body depends on the contraction of skeletal muscles. In this experiment you will first observe the characteristics of muscle contraction and then will investigate the effects of two factors - temperature and fatigue - on the action of your muscles.

MATERIALS:

dishpan of water
narrow strip of paper which will fit around upper arm
ice or snow
rubber ball or clothespin
timer (clock, watch, or stop watch)

PROCEDURE:

The following exercises will help you understand what happens to your muscles when they contract.

Muscle Action

1. Place your fingers along the angle of your jaw just in front of your ear. Grit your teeth and observe what happens to the hardness of the muscles in your cheek.
2. With the thumb and little finger of one hand, span the opposite arm's biceps (front muscle of the upper arm) from the elbow to as close to the shoulder as possible. Bend the arm and observe the change in the length of the muscle.
3. Wrap a strip of paper around your upper arm and mark the circumference of your arm on the paper. Clench your fist tightly and mark the new circumference on the paper. Observe what happens to the circumference of the muscle.

Effect of Temperature on Muscle Action

1. Count the number of times you can make a fist in 20 seconds. Start with your hand completely outstretched and make a tight fist each time. Do it as rapidly as you can. Record the count in Figure 1.
2. Now submerge your hand in a dishpan of water to which has been added snow or ice so that the temperature is near the freezing point. Leave your hand in the water for one full minute.
3. Remove your hand and immediately count how many forceful fists you can make in 20 seconds. Record in Figure 1.

Figure 1: Effect of Temperature on Muscle Action

Temperature	Number of Fists
Normal	
Ice Water	

Effect of Fatigue on Muscle Action

1. Count how many times you can tightly squeeze a rubber ball in your hand in 20 seconds. Record in Figure 2.
2. Repeat the squeezing nine more times and record results. Do not rest between trials.

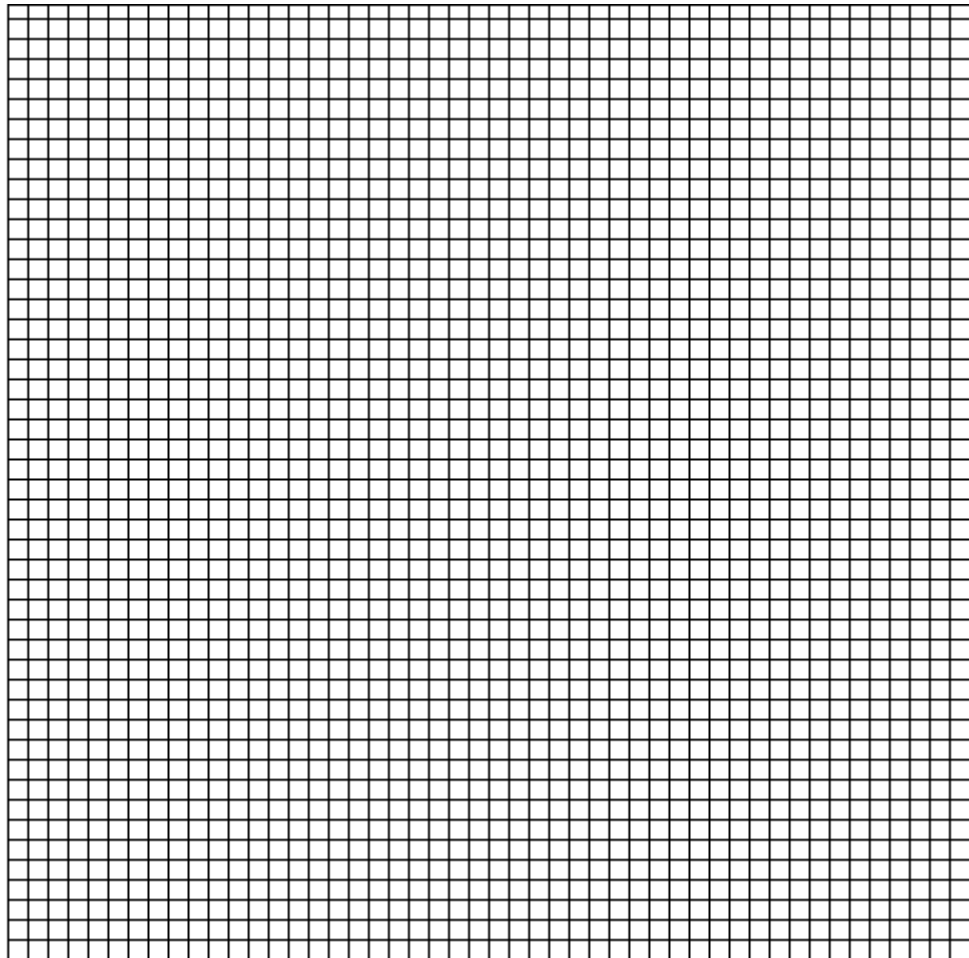
(An alternative procedure which works well is to open and close a clothespin with the thumb and index finger while the other fingers are held out straight.)

Figure 2: Effect of Fatigue on muscle action

Trial	# of Squeezes in 20 seconds	9 More X's
1		
2		
3		
4		
5		
6		
7		
8		
9		

ANALYSIS OF DATA:

1. What are the three changes you observed in a muscle while it is working (contracted)?
2. What effect did the cold temperature have on the action of your hand muscles? Explain.
3. In Figure 3, make a line graph of your results of the fatigue experiment. Be sure to fill in the values on the vertical axis.

Figure 3: Graph of Effect of Fatigue on Muscle Action**Number of Squeezes****Attempts Number**

4. What effect did fatigue have on the action of your hand muscles? Explain.
